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ABSTRACT

Discriminant analysis of vigilance performance measures differentiated 11 adolescents with attention deficit disorder and hyperactivity from 20 adolescents with conduct disorder, while univariate analyses of variance failed to reveal statistically significant differences between the two groups. While both groups displayed similarities in inhibition deficit, the results indicated that attentional behavior is not identical in these two disorders, especially with respect to variability in performance. This study highlights the importance of multivariate approaches in psychiatric research and suggests that relevant information which is contained in the relationship between variables may escape detection by univariate methods. (Author/CL)

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VIGILANCE PERFORMANCE IN ATTENTION-DEFICIT DISORDER AND CONDUCT DISORDER

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ABSTRACT

Relevant information which is contained in the relationship between variables may escape detection by univariate methods. Discriminant analysis of vigilance performance measures differentiated subjects with attention deficit disorder from adolescent subjects with conduct disorder, while univariate analyses of variance failed to reveal statistically significant differences between the two groups. While both groups display similarities in inhibition deficit, the results indicate that attentional behavior is not identical in these two disorders, especially with respect to variability in performance. This study highlights the importance of multivariate approaches in psychiatric research.

INTRODUCTION

In a recent study (1), no statistically significant differences were found in attentional performance between unmedicated adolescent schizophrenics and adolescents with other psychiatric diagnoses. In that study, results were analysed using ANOVA and t-tests. However, the use of one-way analysis of variance on each variable does not allow the researcher to explore differences between groups with respect to several variables simultaneously. The absence of statistical significance with the use of univariate methods of analysis can (and very often does) lead to acceptance of the null hypothesis of 'no difference' when, in fact, such differences in combination might provide for robust discrimination between samples or cohorts.

This study was undertaken to pursue a multivariate comparison of vigilance performance of adolescents with DSM-III (2) diagnoses of conduct disorder and attention deficit disorder with hyperactivity, drawn from the same samples as (1). An additional reason for comparing these two groups on attentional performance is the continuing 'controversy' over the independence of conduct disorder and attention deficit disorder (3-7).

METHODS

Subjects

Subjects were 20 unmedicated inpatient adolescents who fit DSM-III criteria for conduct disorder (CD) and 11 unmedicated

inpatient adolecents who fit DSM-III criteria for attention deficit disorder with hyperactivity (ADD/H). The subjects had no history of substance abuse, seizures, other major medical disorders, focal or diffuse neurological impairment or sensory deficits. The two groups did not differ significantly in age and IQ (Table I). The subjects participated in the study after written informed consent was obtained.

Procedure

The vigilance task has been previously described (8). Following oral instructions and a brief practice run, the subject, who sat in a sound-attenuated darkened chamber, was presented, via a tachistoscope, with a series of stimuli consisting of white circles against a black background. The subject was instructed to respond to the circles with a black dot close to the top (signals) by pressing a microswitch held in the dominant hand, and not to respond to the circles with a black dot close to the bottom (nonsignals). Each stimulus appeared on the screen for a duration of 100 milliseconds and interstimulus interval was 2000 milliseconds. Two signal to nonsignal configurations were used. In one, the signals appeared infrequently and the nonsignals appeared very frequently (signal-infrequent, SI condition), requiring only periodic responding; in the other, the signals appeared very frequently and the nonsignals appeared infrequently (signal-frequent, SF condition), requiring almost continuous responding. The mean

signal:nonsignal ratio was 1:4 in the SI condition and 4:1 in the SF condition (range 1:1-1:8). The testing session (not including instructions and practice-run) lasted 23 minutes.

Data Analysis

Reaction time (RT) and error data were analysed using univariate analyses of variance (ANOVA), t-tests and discriminant analysis (9).

RESULTS

ANOVAs failed to reveal statistically significant differences between the CD and ADD/H groups in RT or error rates (Table 1). While RTs of the ADD/H group were longer than the RTs of the CD group, these differences did not attain statistical significance. For both groups, RT for the SF condition was significantly shorter than RT for the SI condition (Table 1).

Tables 2 and 3 summarize the results of the discriminant analyses, using RT (Table 2A), RT variability (Table 2B), errors (Table 2C), and all variables combined (Table 2D). Correct classification (predicted group membership) ranged from 80-95% for CD subjects and from 64-82% for ADD/H subjects. The Tau value (10) is a measure of the degree of correct prediction of group membership above chance level (50% in the case of two groups). Tau values ranged from 0.48 to 0.81; i.e., correct prediction of group membership ranged from 48% above chance level (RT) to 81% above chance level (all variables).

DISCUSSION

For both the CD and ADD/H groups, RT was shorter in the SF condition than in the SI condition. This is consistent with other findings in children with ADD (11) and in normal adults (Yellin and Breiland, in preparation). This is most likely due to the fact that the almost continuous responding in the SF condition enables the development of a response 'rhythm.' The high percentage of commission errors in the SF condition by the ADD/H group (Table 1) is also consistent with other findings (11,12). This condition requires periodic inhibiting of ongoing responding, and the high error rate is consistent with clinical symptomatology (impulsivity, 2) and other research findings of poor response inhibition (13,14). Conduct disorder is also characterized by impulsivity (3,4,6,7,15), and the high commission error rate of the CD group in the SF condition -- similar to that of the ADD/H group (Table 1) -- is consistent with the above, and indicates similarities in inhibition impairment in these two diagnostic groups.

The results of this study are yet another demonstration that multivariate techniques are very useful and powerful with respect to behavioral and psychophysiological data (15,16). What acharacterizes a clinical syndrome is patterns of interrelationships between symptoms, not merely the presence of certain symptoms. The results of this study indicate that, while individual symptoms may not differ significantly, the attentional

'pattern' of adolescents with conduct disorder is different from that of adolescents with ADD/H, and support other studies (6,7) in retaining these two syndromes as two independent diagnostic entities. The results also suggest that within-group variability is greater in ADD/H than in CD, as indicated by the lower percentage of correctly classified ADD/H subjects. Indeed, RT variability was a more powerful discriminator than RT. This and the greater variability in error rates point to greater fluctuations in the scanning processes of subjects with ADD/H. The number of subjects used in this study is not large enough to justify a statement about the stability of the findings. The results do indicate that precision of classification increased with an increase in the number of variables (Table 2), as would be expected in behavior which is determined by, and therefore, best measured with, multiple variables. Similar data from larger samples should make it possible to derive reliable discriminant functions that will shed needed light on the relationship between conduct disorder and attention deficit disorder, and have clinical utility in diagnostic workup and treatment evaluation.

Table 1: Comparison of the Conduct-Disorder (CD) and Attention-Deficit-Disorder-with-Hyperactivity (ADD/H) Groups on Age, IQ, and Performance on the SI and SF Attentional Tests

	CD (N=20)		ADD/H (N=11)		
	Mean	SD	Mean	SD	
Age (mo.)[1]	173	21	172	23	
IQ (WISC-R)[1]	99	11	99	14	
SI					F
RT (ms)	483	82	543	91	2.042[2]
Omission errors (%)	1.5	4.1	4.9	5.7	2.554[2]
Commission errors (%)	2.6	2.3	3.6	3.0	0.039[2]
SF					F
RT (ms)	429[3]	105	452[4]	104	0.001[2]
Omission errors (%)	4.0	3.7	3.1	6.7	2.288[2]
Commission errors (%)	30.2	21.2	33.1	22.1	0.229[2]

[1]N.S., Student's t-test, 2-tailed

[2]N.S., ANOVA (df=1,29)

[3](RT/SF)<(RT/SI), df=19, p=0.006, Student's t-test, 2-tailed

[4](RT/SF)<(RT/SI), df=10, p=0.014, Student's t-test, 2-tailed

Table 2: Results of Discriminant Analyses of Vigilance Performance Using RT, (A), RT variability (B) Error Measures (C) and All Variables (D)

Actual Group		Number of Cases	Predicted Group Membership 1	2
(A) RT				
CD	1	20	16	4
			80.0%	20.0%
ADD/H	2	11	4	7
			36.4%	63.6%
Percent of cases correctly classified = 74.19				
Tau = 0.48				
(B) RT Variability (SD)				
CD	1	20	18	2
			90.0%	10.0%
ADD/H	2	11	2	9
			18.2%	81.8%
Percent of cases correctly classified = 87.10				
Tau = 0.74				
(C) Errors				
CD	1	20	18	2
			90.0%	10.0%
ADD/H	2	11	3	8
			27.3%	72.7%
Percent of cases correctly classified = 83.87				
Tau = 0.68				
(D) All Variables				
CD	1	20	19	1
			95.0%	5.0%
ADD/H	2	11	2	9
			18.2%	81.8%
Percent of cases correctly classified = 90.32				
Tau = 0.81				

REFERENCES

1. Erickson WD, Yellin AM, Hopwood JH, et al: The effects of neuroleptics on attention in adolescent schizophrenics. Biol Psychiat (in press).

2. DSM-III. Diagnostic and Statistical Manual of Mental Disorders. Washington, D.C., The American Psychiatric Association, 1980.

3. Qua HC: Comments on conduct disorder, attention deficit disorder and hyperactivity. Paper presented at the Annual Meeting of the American Psychological Association, Montreal, Canada, September, 1980.

4. Sandberg ST, Weiselberg M, Shaffer D: Hyperkinetic and conduct problem children in a primary school population: Some epidemiological considerations. J Child Psychol Psychiat 21:293-311, 1980.

5. Stewart MA, Cummings C, Singer S, et al: The overlap between hyperactive and unsocialized aggressive children. J Child Psychol Psychiat 22:35-45, 1981.

6. Edelbrock C, Costello AJ, Kessler MD: Empirical corroboration of the attention deficit disorder. Paper presented at the Annual Meeting of the American Academy of Child Psychiatry, Washington, D.C., October 1982.

7. Trites RL, Laprade K: Evidence for an independent syndrome of hyperactivity. J Child Psychol Psychiat 24:573-586, 1983.

8. Yellin AM: A standard visual stimulus for use in studies on attention deficit disorders: Toward the development of standardized sustained and selective attention tests. Res Commun Psychol Psychiat Behav 5:137-143, 1980.

9. Klecka WR: Discriminant analysis, in SPSS: Statistical Package for the Social Sciences. Edited by Nie NH, Hull CH, Jenkins JG et al. New York, McGraw Hill Book Co., 1975 (second edition), pp 434-467.

10. Klecka WR: Discriminant Analysis. Beverly Hills, Sage Publications, 1980.

11. Yellin AM, Greenberg LM, Hopwood JH: Inhibition deficit disorder (IDD): Evidence supporting differentiation from attention deficit disorder. Paper presented at the Annual

Meeting of the American Academy of Child Psychiatry, San Francisco, October 1983.

12. Yellin AM, Hopwood JH, Greenberg LM: Adults and adolescents with attention deficit disorder: Clinical and behavioral responses to psychostimulants. J Clin Psychopharmacol 2:133-136, 1982

13. Rosenthal RH, Allen TW: An examination of attention, arousal and learning dysfunctions of hyperkinetic children. Psychol Bull 85:689-715, 1978.

14. Yellin AM: Recent advances in psychophysiology: Psychophysiological studies in hyperkinesis. Res Commun Psychol Psychiat Behav 3:237-255, 1978.

15. Donchin E, Herning RI: A simulation study of the efficacy of stepwise discriminant analysis in the detection and comparison of event-related potentials. Electroenceph Clin Neurophysiol 38:51-68, 1975.

16. Horst RL, Donchin E: Beyond averaging: II. Single-trial classification of exogenous event-related potentials using stepwise discriminant analysis. Electroenceph Clin Neurophysiol 48:113-126, 1980.